PATENT COOPERATION TREATY

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From the
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

To:

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PCT

NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Rule 71.1)

Date of mailing *(day/month/year)*	22.04.2004

Applicant's or agent's file reference	IMPORTANT NOTIFICATION
MK/SD/P12766PC	

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/GB 03/01284	26.03.2003	28.03.2002

Applicant
THE UNIVERSITY COURT OF THE UNIVERSITY OF ST. ...

1. The applicant is hereby notified that this International Preliminary Examining Authority transmits herewith the international preliminary examination report and its annexes, if any, established on the international application.

2. A copy of the report and its annexes, if any, is being transmitted to the International Bureau for communication to all the elected Offices.

3. Where required by any of the elected Offices, the International Bureau will prepare an English translation of the report (but not of any annexes) and will transmit such translation to those Offices.

4. **REMINDER**

The applicant must enter the national phase before each elected Office by performing certain acts (filing translations and paying national fees) within 30 months from the priority date (or later in some Offices) (Article 39(1)) (see also the reminder sent by the International Bureau with Form PCT/IB/301).

Where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary examination report. It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned.

For further details on the applicable time limits and requirements of the elected Offices, see Volume II of the PCT Applicant's Guide.

The applicant's attention is drawn to Article 33(5), which provides that the criteria of novelty, inventive step and industrial applicability described in Article 33(2) to (4) merely serve the purposes of international preliminary examination and that "any Contracting State may apply additional or different criteria for the purposes of deciding whether, in that State, the claimed inventions is patentable or not" (see also Article 27(5)). Such additional criteria may relate, for example, to exemptions from patentability, requirements for enabling disclosure, clarity and support for the claims.

Name and mailing address of the international preliminary examining authority:	Authorized Officer
European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Ullrich, C Tel. +49 89 2399-2322

PATENT COOPERATION TREATY

PCT Rec'd PCT/PTO 28 SEP 2004

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference MK/SD/P12766PC	FOR FURTHER ACTION	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
International application No. PCT/GB 03/01284	International filing date *(day/month/year)* 26.03.2003	Priority date *(day/month/year)* 28.03.2002
International Patent Classification (IPC) or both national classification and IPC A61B5/00, A61B5/00		
Applicant THE UNIVERSITY COURT OF THE UNIVERSITY OF ST. ...		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 5 sheets, including this cover sheet.

   ☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

   These annexes consist of a total of 3 sheets.

3. This report contains indications relating to the following items:

   - I ☒ Basis of the opinion
   - II ☐ Priority
   - III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - IV ☐ Lack of unity of invention
   - V ☒ Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
   - VI ☐ Certain documents cited
   - VII ☐ Certain defects in the international application
   - VIII ☐ Certain observations on the international application

Date of submission of the demand	Date of completion of this report
03.09.2003	22.04.2004
Name and mailing address of the international preliminary examining authority: European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized Officer Lohmann, S Telephone No. +49 89 2399-2328

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/GB 03/01284

I. Basis of the report

1. With regard to the **elements** of the international application *(Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17))*:

Description, Pages

1-21 as originally filed

Claims, Numbers

1-18 filed with telefax on 01.03.2004

Drawings, Sheets

1/14-14/14 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

   These elements were available or furnished to this Authority in the following language: , which is:

   ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).

   ☐ the language of publication of the international application (under Rule 48.3(b)).

   ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

   ☐ contained in the international application in written form.

   ☐ filed together with the international application in computer readable form.

   ☐ furnished subsequently to this Authority in written form.

   ☐ furnished subsequently to this Authority in computer readable form.

   ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

   ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

   ☐ the description, pages:

   ☐ the claims, Nos.:

   ☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).

   (Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1-18
	No:	Claims	
Inventive step (IS)	Yes:	Claims	7
	No:	Claims	1-6, 8-18
Industrial applicability (IA)	Yes:	Claims	1-18
	No:	Claims	

2. Citations and explanations

   see separate sheet

Re Item V

1 Reference is made to the following documents:

D2: US-A-4 407 292 (EDRICH JOCHEN) 4 October 1983; cited in the application
D3: US-A-4 557 272 (CARR KENNETH L) 10 December 1985
D6: US-A-4 774 961 (CARR KENNETH L) 4 October 1988

2 The present application does not meet the requirements of Article 33(1) PCT, because the subject-matter of independent claim 1 does not involve an inventive step under Article 33(3) PCT.

2.1 Document D2 discloses a non-contact passive medical scanning imager having most features of claim 1. In particular, D2 teaches scanning means (cf. the par. bridging col. 2 and 3) as claimed. Furthermore, the imager of D2 is a **passive** one without an excitation source (cf. the abstract and col. 2, l. 49-55).
It is emphasized that the sensitivity profile of the collected radiation as taught by D2 (like in all cited documents) is 'defined across and along substantially the entire length of the collection path', since this characteristic amounts to an inherent feature, e.g. realizable by means of waveguides. The difference between a '**defined**' and e.g. a **constant** sensitivity profile, which is, however, not referred to in the specification, is to be noticed.

Consequently, document D2 discloses an apparatus from which the subject-matter of claim 1 differs in that isolation means in the path of the collected radiation are provided.

The subject-matter of claim 1 is therefore new under Article 33(2) PCT.

2.2 The problem to be solved by the present invention may be regarded as how to avoid back-reflection of millimetre-waves from the detector into the collection path, which back-reflection decreases the sensitivity of the apparatus.

The solution proposed in claim 1 of the present application cannot be considered as involving an inventive step, since the use of isolators for avoiding back-reflections amounts to very basic knowledge, which is certainly known and obvious to any person skilled in the field of microwave-technology.

Furthermore, this feature has already been employed for the same purpose in a similar apparatus (cf. col. 10, l. 62 - col. 11, l. 20 in D3 or col. 9, l. 48 - col. 10, l. 14 in D6). It would therefore, also for this reason, be obvious to the person skilled in the art, namely when the same result is to be achieved, to apply these features with corresponding effect to an imager according to document D2, thereby arriving at an imager according to claim 1.

In view of these arguments, the subject-matter of claim 1 does not involve an inventive step in the sense of Article 33(3) PCT.

2.3 The features brought forward in dependent claims 2-6 and 8-18 are also taught by the cited documents D2, D3 and D6 or merely directed towards straightforward possibilities or slight constructional changes in the device of claim 1 which come within the scope of the customary practice followed by persons skilled in the art, especially as the advantages thus achieved can readily be foreseen.

2.4 An axicon as defined in claim 7 reduces the problem of diffraction loss and is not taught by any cited document. It does not seem to be a generally known tool in microwave technology.

Consequently, the subject-matter of claim 7 is new and involves an inventive step in the sense of Articles 33(2) and (3) PCT.

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Claims

1. A non-contact passive medical scanning imager for imaging subcutaneous body temperature comprising:

a detector for sensing millimetre wave electromagnetic radiation;

a collector for collecting radiation emitted from a patient and directing that radiation along a collection path to the detector in such a manner that the collected radiation has a defined sensitivity profile across and along substantially the entire length of that path;

scanning means for causing a scan of a target area of the patient, and

isolation means in the path of the collected radiation for preventing signal leakage from the detector being emitted towards the patient's body, preferably wherein the isolation means comprise a quasi-optical isolator.

2. An imager as claimed in claim 1, wherein the collector comprises a feedhorn, in particular a corrugated feedhorn.

3. An imager as claimed in claim 2, wherein the collector comprises a waveguide for supplying radiation to the detector.

4. An imager as claimed in any of the preceding claims, wherein the collector is such that the collected radiation has a Guassian sensitivity profile.

5. An imager as claimed in claim 4 when dependent on claim 3 or claim 4, wherein the feedhorn is arranged to convert a fundamental Gaussian mode beam of radiation created by the collector into a waveguide mode in which radiation propagates through the wave guide to the detector.

6. An imager as claimed in any of claims 1 to 3 wherein the collector is such that the collected radiation has a Bessel sensitivity profile.

7. An imager as claimed in claim 6 including an axicon.

8. An imager as claimed in any of the preceding claims wherein the collector includes focussing means.

9. An imager as claimed in any of the preceding claims, wherein the scanning means are operable repeatedly to sweep the collection path through 360°.

10. An imager as claimed in claim 9, wherein the scanning means comprise a deflector that is rotatable about one axis to scan the collection path in a scanning direction across a body.

11. An imager as claimed in claim 10 further comprising line-indexing means for moving the collection path in a direction perpendicular to the scanning direction.

12. An imager as claimed in claim 11, wherein the indexing means are operable to move the deflector linearly along said axis or comprise means for swinging the deflector about a second axis perpendicular to the first axis.

13. An imager as claimed in any of the preceding claims that is operable to form an image from emitted radiation in the frequency range of 10-200GHz, for example 90-100GHz.

14. An imager as claimed in any of the preceding claims including one or more calibration loads for emitting millimetre wave radiation at a pre-determined intensity, the apparatus being operable to direct said radiation to the detector to enable the apparatus to be calibrated.

15. An imager as claimed in claim 14, wherein the calibration load is provided in the scanning path of the imager, so that the imager can be calibrated for each pass of the collector.

16. An imager as claimed in claim 14 or claim 15, wherein two calibration loads are provided, together with means for maintaining them at different temperatures, the temperatures preferably straddling the range of subcutaneous body temperatures to be imaged.

17. An imager as claimed in any of the preceding claims wherein the detector is linearly polarised.

18. An imager as claimed in claim 17 further including polarisation means for altering the polarisation of received radiation so as to align with the polarisation of the detector.